213 Positive expiratory pressure values in infants: A pilot study

R. Stewart[1], P. Anderson[1]. [1]*Royal Hospital for Sick Children, Glasgow, United Kingdom*

Background: Positive expiratory pressure (PEP) therapy forms the basis of airway clearance in cystic fibrosis (CF). National guidelines suggest that resistance for PEP should be between 10 and 20 cmH20. However, there are no guidelines for infants. Based on the fact that infant airways are more compliant than adults, it was hypothesised that PEP pressures reached in infants would be less than the literature suggests but with similar outcomes.
Aim: To determine peak and average pressures achieved with PEP therapy in infants with CF under the age of 3.
Methods: This study focused on infants (N = 9) with CF who use a PEP mask as part of their normal routine. A digital manometer (Druck DPI 700) was attached to a PEP mask via 80 cm of 02 tubing. Peak pressures were recorded every 2nd breath for 10 breaths and an average pressure was then also calculated.
Results: Average pressure of 4.37 cmH20 with SD of 2.31 cmH20.
Conclusion: All average pressures achieved in this study were below the current guidelines of 10–20 cmH20. Only 3 readings out of 45 hit this range. In our clinical practice in infants we find these parameters have a positive clinical effect. Longer-term, higher-powered trials are indicated.

Reference(s)

Darbee, J.C et al (2004) Physiologic evidence for the efficacy of positive expiratory pressure as an airway clearance technique in patients with cystic fibrosis. *Phys Ther*. 84: 524–537.
Elkins M et al (2006) Positive expiratory pressure physiotherapy for airway clearance in people with cystic fibrosis. *Cochrane Database of Systematic Reviews Issue 2*.

214 Individual efficacy of Cough Technique versus Forced Expiration Technique in cystic fibrosis

S. Gursli[1], L. Sandvik[2], B. Skrede[1], B. Stuge[3]. [1]*Oslo University Hospital, Ulleval, Norwegian Resource Centre for Cystic Fibrosis, Oslo, Norway;* [2]*Oslo University Hospital, Ulleval, Dept of Biostatistics, Epidemiology and Health Economics, Oslo, Norway;* [3]*Oslo University Hospital, Ulleval, Dept of Ortopaedics, Oslo, Norway*

Background: Physiotherapy for airway clearance is recommended in cystic fibrosis, but limited evidence exists to suggest that one technique or approach is better than another. Removal of bronchial secretions is essential, and Forced Expiration Technique (FET) is commonly used, though a new Cough Technique (CT) might represent an alternative.
Objectives: To compare short-term efficacy of CT versus FET on sputum expectoration and to investigate patient's preferences.
Methods: Randomized controlled individual trials in six patients were conducted. Each trial included 8 weeks of treatment periods with two interventions each week, one with CT and one with FET. Primary outcome measure was sputum wet weight (g). Secondary outcomes were self-reported preference and perceived utility value. Additional measurements included oxygen saturation, heart rate and lung function.
Results: Most patients removed more sputum with CT than with FET. Sputum weight favoured CT in 8 of 8 possible weeks in three patients ($p = 0.008$), in 7 of 8 weeks in one patient ($p = 0.062$), and in 6 of 8 weeks in one patient ($p = 0.296$). FET was the most effective in one patient in 7 of 8 weeks ($p = 0.062$). In the patients with significantly higher mean sputum weight when using CT, differences were 21%, 39% and 23% respectively. Patients reported both techniques as effective, easy to understand and to perform, CT being associated with greater ease to use and normalizing in everyday life. Three patients preferred CT, one FET, and two had no preference.
Conclusion: CT appears to be effective, safe, and preferred in most patients, thus providing a promising alternative to FET in daily treatments.

215 Comparison of acute effects of conventional high frequency chest oscillation (HFCWO) and hand held percussor (Electro-Flo 5000) for airway clearance in cystic fibrosis patients

C. Dunn[1], Z. Davies[1], L. Kim[1], J. Zirbes[1], C. Everson[1], C. Milla[1]. [1]*Stanford University, Palo Alto, United States*

Objectives: An arsenal of treatment options for airway clearance is available to CF patients. We proposed that a small hand held percussor (Electro-Flo 5000, EF) with postural drainage would provide as much benefit in mucous clearance as that obtained with the high frequency chest wall oscillation Vest (HFCWO).
Methods: This was a randomized, cross over study in which fifteen CF patients (13–53 years of age) with daily sputum production were enrolled. Participants were randomized to a therapy session with either EF or HFCWO. Participants were required to come to clinic in the morning for two separate study visits, one day apart. Therapy was provided by a registered respiratory therapist proficient in both modalities. The primary outcome was sputum production. During the therapy session any sputum produced was collected in a pre-weighed cup. Sputum was weighed immediately and was then placed without a lid into a 150ºC oven for 72 hours to measure the sputum solids dry weight. Secondary measures included changes in respiratory rate, pulse oximetry, and pulmonary function as a result of each therapy session.
Results: The therapy sessions with both devices were well tolerated. No difference in sputum production, being it wet (4.6 g ±3.8 EF vs. 4.13 g ±2.7 HFCWO) or dry (0.18±0.25 g EF vs. 0.15±0.16 g HFCWO) weights, was noted between the treatments ($p > 0.2$ for comparisons). Only small, non-significant changes were noted in all secondary outcomes between treatment groups.
Conclusion: Both therapeutic modalities were comparable in their efficacy in promoting sputum mobilization. No significant effects in other clinical parameters were noted.

216 Periodic application of continuous positive airway pressure (pCPAP) as airway clearance technique during advanced lung disease in cystic fibrosis: Another clue?

S. Gambazza[1], S. Zuffo[2], D. Innocenti[2], R. Pasotto[3], E. Mariotti[2], M. Masolini[2], C. Braggion[3]. [1]*Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Cystic Fibrosis Centre, Milano, Italy;* [2]*AOU Meyer, Rehabilitation Unit, Florence, Italy;* [3]*AOU Meyer, Cystic Fibrosis Centre, Florence, Italy*

Background: Literature confirms that there is little evidence to support the use of one airway clearance technique over another. Patients' preference continues to be the factor when dealing with respiratory physiotherapy (RP). In our practice replacement of the widely accepted PEP-Mask with pCPAP is suspected to occur when there is a repeated subjective worsening of respiratory conditions.
Aim: To show any evidence that pCPAP comes when clinical picture worsen; to investigate any relationship between pCPAP beginning and non-invasive ventilation initiation (NIV).
Methods: We revised 283 clinical records of patients regularly followed in 2010. Descriptive analysis and contingency tables were performed together with Wilcoxon signed rank test with significance set at 5%.
Results: 20 patients substituted the usual PEP-Mask with pCPAP. It was started at 24.7 mean age (sd 10.9, min 3.6-max 40). 88.6% had a Fev_1 <40 and 53.3% was underweight. 40% of patients was chronically colonized with *Pseudomonas aeruginosa* and 52.9% did more than 4 i.v. treatment/year. 50% was already on oxygen therapy and only 10% was on NIV at night. pCPAP was initiated because of desaturation during PEP-Mask (50%), global fatigue (35%) and dyspnoea (15%) during physiotherapy. A significant association between oxygen therapy and i.v. therapies was found ($p = 0.002$) and pCPAP was initiated signficantly in advance ($p = 0.01$) compared to NIV.
Conclusions: Respiratory physiotherapy carried out using pCPAP occurs significantly before the introduction of NIV and in advanced lung disease. As a "bridge to bridge", pCPAP might sustain airway clearance sessions and relief symptoms.